# AI for Good: Data Science for Automotive

## Session 2: The rise of automotive AI data infrastructure

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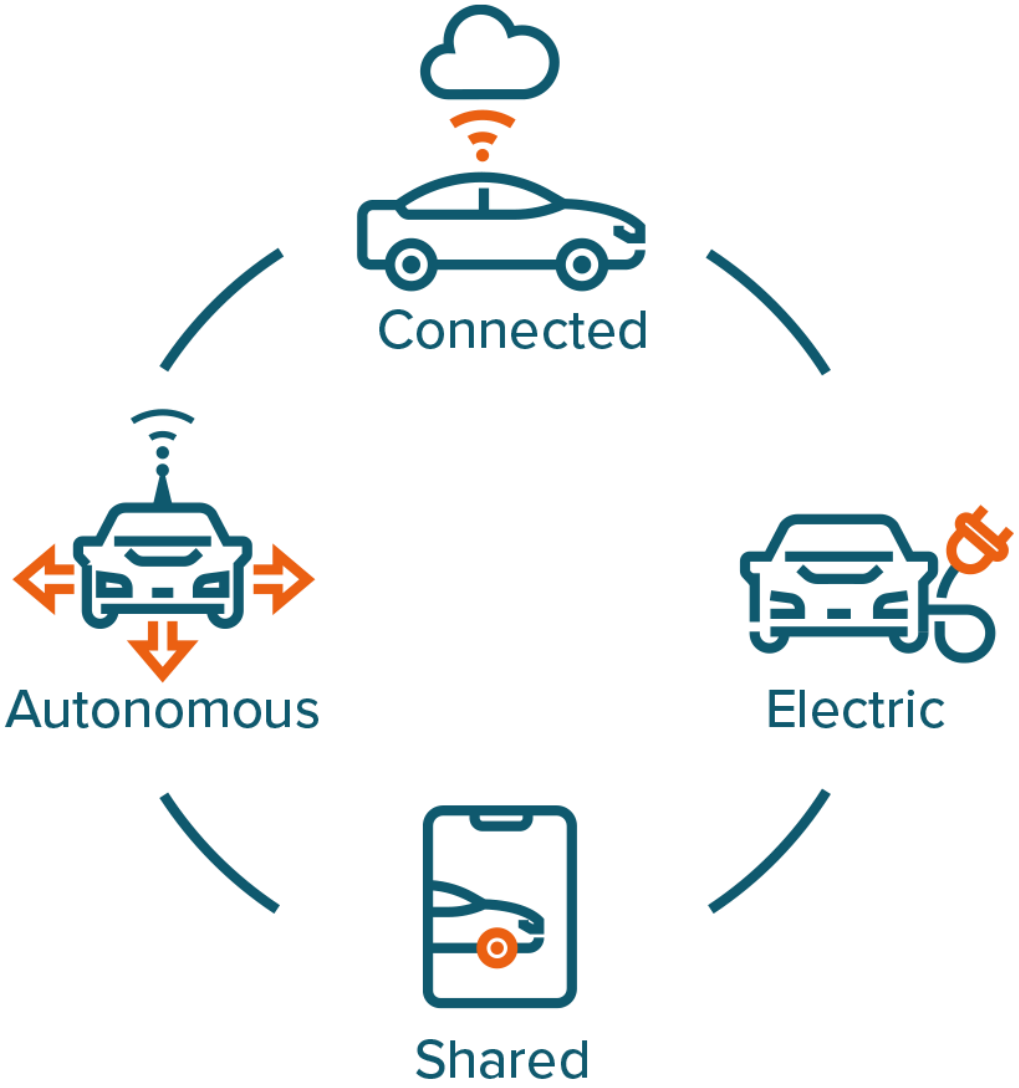
AI for Good Summit | Future Networked Car Symposium | Geneva | 9 July 2026

# The automotive industry is going through massive change

AI is the engine for an optimal transition towards Connected, Electric, Shared, and Autonomous Vehicles (CESAVs).

By integrating machine learning and real-time data, AI solves complex challenges across power distribution, traffic coordination, and fleet operations, transitioning mobility from a private-ownership model to efficient, on-demand services.



# Connected cars can support “AI for Good”

We can accelerate UN SDG Target 11.2 by leveraging connected cars to provide safe, affordable, accessible, and sustainable transport.

**Optimising traffic and flow:** AI algorithms in connected cars use mobility data to optimise routes in real time. By communicating with traffic management systems and other vehicles, connected cars reduce congestion and smooth out start-and-stop driving, thereby cutting greenhouse gas emissions.

**Enhancing public transit integration:** AI models that integrate connected vehicle networks with public transit allow cities to coordinate multimodal trips, reduce wait times at transit hubs, and provide highly dependable, accessible mobility solutions for communities.

**Road safety and accessibility for all:** Initiatives like the ITU AI for Road Safety program use AI to analyse safety data and deploy assisted driving technologies. Connected car sensors can detect dangerous driving behaviors, early-warning accident indicators, and infrastructure issues, ensuring safer roads for vulnerable groups and encouraging the use of shared or public transport systems.


Provide universal access to safe, affordable, accessible and sustainable transport systems and improve road safety.

# Swiss Data Science Center: Developing & scaling AI for societal impact

# Swiss Data Science Center: National infrastructure with tech transfer mission




Supporting the entire **data science journey** — from data collection and management to machine learning, AI, and industrialization — serving **academic labs**, **hospitals**, **industry**, **private and public sector** stakeholders, including cantonal and federal administrations and NGOs/IOs.

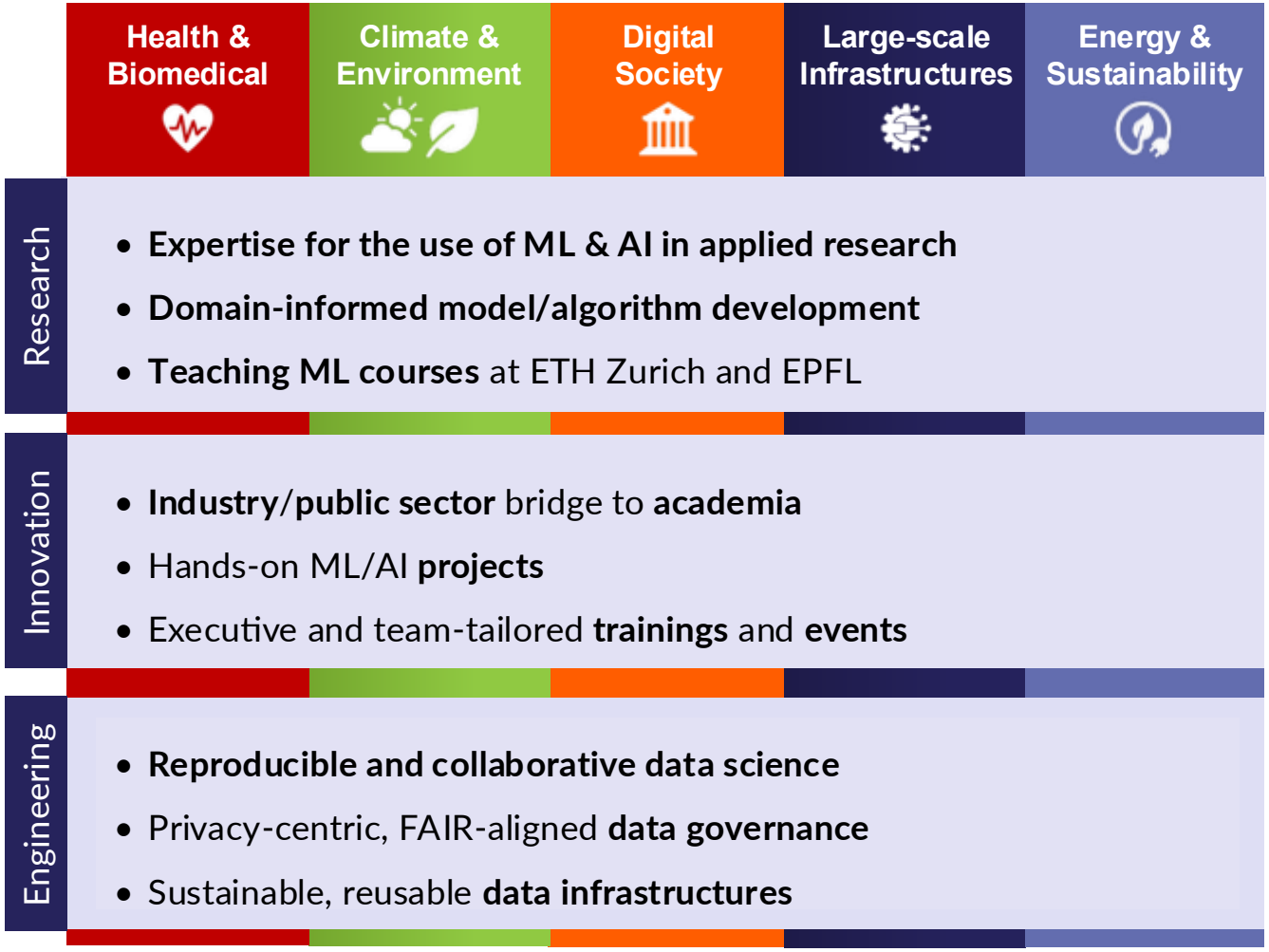
From a **Strategic Focus Area** of the ETH Domain to a **National Research Infrastructure** in 2025

Multidisciplinary, agile and impact-driven team of **130 professionals** across multiple locations

Research, Innovation, Engineering & Services, Initial and Continuing Education

Health & Biomedical, Climate & Environment, Energy & Sustainability, Large-scale Infrastructures Digital Society

# Research, innovation, and engineering serving Swiss vertical priorities




- **"National Research Infrastructure"** since 2025
- **Verticals** covering **key Swiss/ETH R&D domains**
- Domain-specific **services**
- Joint **research, innovation & engineering** services
- **Trusted AI-ready data infrastructure** as foundational block

# Data science and AI competencies

**We are platform and model agnostic. We combine multimodal data from a variety of sources to provide optimal results.**

- **Internal data:** Domain specific and customer data
- **Public data:** High authority public datasets
- **Sensor data:** IoT, devices/edge, sensors, computer vision

## Operational efficiency & automation

- Workflow optimisation and automation
- Decision-support tools
- Agentic AI workflows & RAG systems
- Data ontology design & segmentation

## Data-driven insights & predictive analytics

- Trend analytics and value creation
- Cost reduction pipelines
- Forecasting e.g. dynamic pricing
- Personalised risk assessments

## Enhanced customer interaction & service delivery

- Data-driven customer segmentation
- Marketing campaign optimization
- Recommender systems
- LLM assistants
- Supportive digital interfaces

# Data science & AI to power trusted, optimised, interoperable mobility

# From connectivity to trust: Data is the enabler

**Connected data**

Connectivity and data redefine driving and trust.

**Data infrastructure**

More sensors and bandwidth don't automatically produce trustworthy AI.

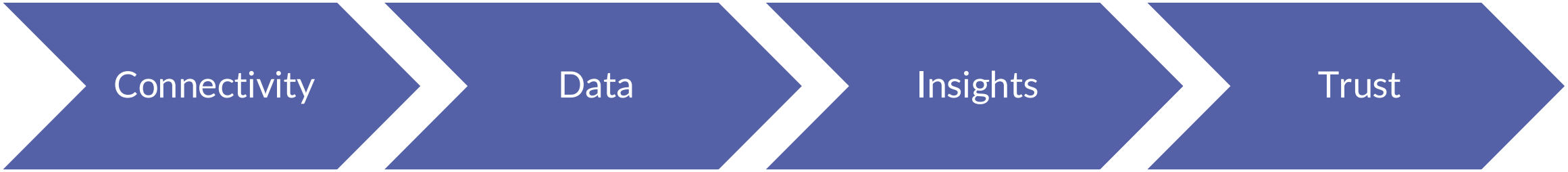
**Data science solutions**

Quality data, good data science, and system interoperability.

# What has changed: Cars used to be mechanical. Now they run on data

Connectivity enables data to be collected and shared.

Automotive data is processed and interpreted real-time. What data is collected and how it is used to produce insights and driving features, is now increasingly defining the driving experience.




It also redefines the relationship between:

- Driver and car: From operator of a machine to supervised passenger in a system that senses, predicts, and acts.
- Carmaker and regulator: From one-time type-approval to continuous, data-driven oversight of systems that keep learning.

# The infrastructure gap: More sensors and data ≠ trustworthy AI

Data volumes are increasing. Ensuring safe, high-quality, comparable, and interoperable data across systems has become the key challenge. Moreover, data needs to be privacy-protecting to build reliable, ethical AI systems for mobility.

**Fragmented standards**

Every OEM, region, and sensor stack structures driving data differently. This makes deriving insights across systems challenging.

**Privacy and security exposure**

Behavioural and location data required for automated driving raises privacy and security risks.

**Quality bounded by governance**

Model performance depends on how the data was collected and curated.

# Pillar 1: Safe, high-quality, interoperable, privacy-protecting data

Reliable, accurate, ethical AI starts upstream, where the data is collected, structured, and governed, long before any model is trained.

## Open standards for mobility data

Researchers and operators benefit from shared, open-source tools and platforms to structure and analyse mobility data so datasets stay comparable across projects instead of siloed by tools and/or teams.

## Privacy-safe synthetic data

Research on causal-intervention frameworks shows how to synthesize realistic mobility data and evaluate predictive models on it. This reduces the need to expose individual trajectories to train AI.

# Pillar 2: Good data science for safe, secure, interoperable mobility

Safety-critical systems need reproducible, tested, robust methods, not just more data. Simulation helps researchers an R&D teams find failure modes before they happen on the road.

## Synthetic scenarios for autonomous systems

As part of the Swiss AI Initiative, the Artificial Intelligence & Machine Learning Institute (AIML) at ETH Zurich worked to train video-based world models on the 'Alps' supercomputer using driving, first-person, and drone footage to generate realistic scenarios for training and stress-testing autonomous-driving systems.

## A digital twin of the Swiss mobility system

With ETH Zurich's Center for Sustainable Future Mobility, SDSC is helping build a Digital Twin of the national mobility system. It’s essentially a testbed for planning and safety analysis at the system level, not just the vehicle level.

# Pillar 3: Clean, smart, safe mobility as the backbone of smart cities

A connected vehicle is also a mobile sensor for the city around it. Automotive data infrastructure feeds the urban systems enabling efficient, multi-modal transportation. But for this to work, car and city data systems have to speak the same language.

## Traffic management

Real-time flow data smooths congestion and improves incident response.

## Air quality and emissions

Vehicle and route data support monitoring and low-emission zone design.

## Public transit and space optimisation

Demand and mobility patterns shape schedules, routing, investment, and land use.

## Infrastructure planning

Longitudinal mobility data informs where cities build, widen, or restrict.

# Best practices

## Data governance and standards

Build well-governed, interoperability and quality checks in from the beginning, before data collection even starts.

## Privacy-by-design, synthetic data if possible

Reduce exposure of individual trajectories while keeping data useful for training and evaluation.

## Open, reproducible methods

Build shared benchmarks and tooling to enable independent teams to verify safety claims.

## Multi-stakeholder collaboration

Ensure industry, regulators, academia, and the public sector design data infrastructures together.

# Let’s partner for mobility research, innovation and/or data science infrastructure

At the Swiss Data Science Center, we work with public and private sector transportation and mobility organisations, and with academia, to design and scale the data science and AI behind connected and autonomous mobility.

From data strategy and governance, to applied model development, and building the reproducible science that regulators and the public can trust, we’d love to work with you!

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# Thank you!

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